BREEDING BIOLOGY OF THE BARN SWALLOW (*HIRUNDO RUSTICA*) IN THE SURROUNDINGS OF BRATISLAVA (SLOVAKIA)

Zlatica Országhová

Department of Zoology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B–1, SK–842 15 Bratislava, Slovakia [orszaghova@fns.uniba.sk]

Abstract: The breeding biology of the barn swallow (*Hirundo rustica* Linnaeus, 1758) was studied in the south–eastern part of Bratislava on the right bank of the Danube during 1993 – 1995. The first egg of the earliest clutch was laid on 29 April and that of the last clutch on 10 August (104 days). The large st number of first clutches (7) were initiated on 12 May. In first clutches, first eggs were laid from 29 April until 25 June (58 days) and in second clutches, from 31 May till 9 August (71 days). The first eggs in third clutches were laid on 13 July and 18 August. The mean clutch size of 162 clutches was 4.5 eggs (the mean for first clutches was 4.9 and for second clutches 4.15). The most numerous clutch size was 5 eggs (i. e. 47 % of clutches), but there were four cases of 7 (0.95 %) and one case of 9 (1.22 %) eggs per clutch. The mean weight of the eggs was 2.09 g (1.25 – 3.0 g), their length 19.5 mm (14.6 – 22.4 mm) and width 13.8 mm (12.4 – 19.0 mm). Of the total number of eggs, 74 % hatched. Nestling mortality between hatching and nest leaving amounted to 5.12 %. The incubation period lasted from 12 to 18 days, with a mean of 14.83 days. The mean interval between nest leaving by the young and the laying of the first egg in the second clutch was 9.5 days. The length of nesting feeding ranged from 14 to 26 days (mean 21 days). The mean length of nesting (from the laying of the first egg the last young fledge) amounted to 41 days with one, and 90 days with two nestings. The length of one nesting was 31 to 74 days. The minimum length of two nestings was 82 and the maximum 100 days.

Key words: Barn Swallow, breeding biology, Bratislava, Slovakia.

INTRODUCTION

Although the barn swallow *(Hirundo rustica* Linnaeus, 1758) occurs at all altitudes in Slovakia (Matoušek & Országhová 1994), its breeding biology has not been given adequate attention. In the former Czechoslovakia, Kondělka (1985) studied clutch size and breeding success in northern Moravia in 1967 – 1979. Pikula & Beklová (1987) report nest dimensions and number of eggs per clutch, length of incubation and egg dimensions from the former Czechoslovakia. In 1963 – 1964, Kuźniak (1967) observed the arrival, nest building, clutch size, feeding of the young and autumn departure of Barn Swallows, in the surroundings of Poznań (Poland). In Denmark, Møller (1982) reported a positive correlation between nest size and clutch size. In Austria, Fally (1989) studied the relationship between breeding success and nest size, nest orientation and location. He observed that clutches in nests located in stables were smaller on average than those in cooler spaces e.g. of storerooms. Møller (1984) found that the mean size of the first

Országhová Z, 2013: Breeding biology of the barn swallow (Hirundo rustica) in the surroundings of Bratislava (Slovakia). ***Folia faunistica Slovaca*****, 18 (1): 91–95.**
[in English]
Received 6 July 2012 ~ Accepted 15 September 2013 ~ Published 29 September 2013

e–ISSN 1336–4529 ISSN 1335–7522

clutch does not depend on the geographical situation of the nesting locality.

The present study deals with length of nesting, clutch size, egg dimensions and breeding success of the Barn Swallow in southwestern Slovakia.

STUDY OF AREA AND METHODS

The study was carried out in 1993 – 1995 on the right bank of the Danube in the south–western part of Bratislava – Rusovce (48°3′ N, 17°10′ E) and Bratislava – Ovsište (48°8′ N, 17°7′ E) in eight stables. Six of these housed cattle. Four of the stables were of the classical type with tiled roofs; two were more modern with a gable roof with glass panes (Bratislava – Rusovce). The stable doors on both side s were kept open most of the year, with air circulating inside all the time. The cattle were stabled all the year round. Two of the stables were for race horses (Bratislava – Ovsište). The smaller one was a brick building, the other, a modern one, was roomy, built of concrete precast units.

All the nests were controlled twice a week. Eggs were weighed using Pesola field scale, to an accuracy of 0.5 g and measured with a slide gauge, with an accuracy of 0.02 mm.

RESULTS

First Eggs and Clutch Size

The study comprised a total 107 nests. Clutches were initiated between 29 April and 10 August (Fig. 1). Hence, the total period during which clutches were started lasted a total of 104 days. The largest number of clutches (7) were initiated on 12 May.

First clutches were started during a period of 58 days (from 29 April to 25 June) and second clutches during 71 days (from 31 May until 9 August). The first eggs in two third clutches were laid on 13 July and 10 August (Fig 1).

A total of 153 nestings took place in 107 nests; the swallows were observed to nest twice in 45 nests, once only in 57 and three times in 2 nests. Nine clutches failed – 5 were abandoned – (three clutches of 6, 5 and 3 eggs, respectively, three clutches of 4 eggs each, two clutches of 1 egg each, one case in which all 4 nestlings of a 4–egg clutch perished). No more than 5 replacement clutches were found in all of the controlled nests.

A total of 739 eggs were laid in 162 clutches, giving a mean of 4.5 eggs per clutch (x = 4.56 ± 0.90; SO = 1.14, n = 162). First clutches nesting had a mean of 4.9 eggs ± 0.94; SO = 0.10, n = 88, second clutches a mean of 4.1 eggs ± 0.14; SO = 1.23, n = 72).

Of the 162 clutches, 77 or 47.53 % had 5 eggs. Among first clutches (n = 88), the corresponding proportion was 57 %. In second clutches 51 out of 72 (45.8 %) had 4 eggs (Table 1).

In four of the nests (three first clutches and one second clutch) we found clutches of 7 eggs. In the case of the 9–egg clutch (Table 1), it cannot be ruled out that the eggs came from two females.

Weight and Dimensions of Eggs

Mean egg weight was 2.0 g (x = 2.09 ± 0.01; SO = 0.23; n = 665), the lightest egg weighing 1.2 g and the heaviest 3.0 g. The latter came from a clutch of 4 eggs. By far the greatest number of eggs (210) weighed 1.88 – 2.00 g (Fig. 2).

The mean length of the eggs was 19.5 mm (x = 19.55 ± 0.037; SO = 0.95; n = 665) – the shortest measuring 14.6 mm and the longest 22.4 mm. Most eggs (103) tell in the range 19.75 – 20.00 mm (Fig. 3).

Mean egg width was 13 mm (x = 13.86 ± 0.022; s_x = 0.56; n= 665) – the narrowest one measuring 12.4 mm and the broadest one 19.0 mm. Most of the eggs (193) had a width between 13.75 and 14.00 mm (Fig. 4).

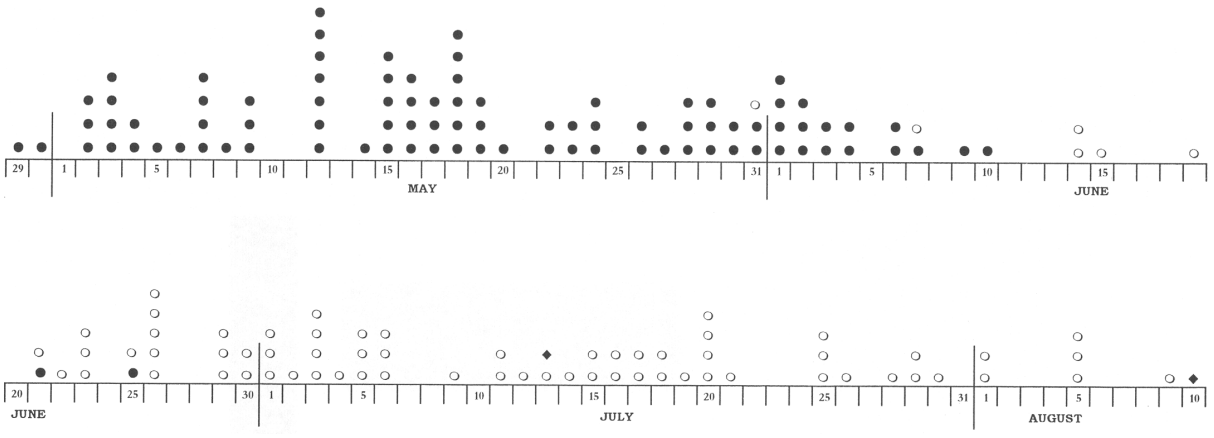

Figure 1. Dates of first egg laying.
Bullets – first clutch, rings – second clutch, diamonds – third clutch.

Table 1. The distribution of clutch sizes in first, second and third clutches of barn swallows near Bratislava.

Nesting	Number of eggs per clutch									
	1	2	3	4	5	6	7	8	9	**Total**
I	1	1	4	14	51	14	3	0	0	**88**
II	4	2	6	33	25	0	1	0	1	**72**
III	0	0	0	1	1	0	0	0	0	**2**
Total	**5**	**3**	**10**	**48**	**77**	**14**	**4**	**0**	**1**	**162**

Table 2. Breeding success of barn swallows near Bratislava.

Nesting	Eggs laid	Eggs hatche (%)	Young fledges (% of)
I	431	329 (73.3%)	315 (95.7%)
II	299	212 (70.9%)	198 (93.4%)
III	9	6 (66.7%)	6 (100%)

Table 3. The length of the incubation period in first, second and third clutches of barn swallows near Bratislava.

Nesting	Incubation period in days						
	12	**13**	**14**	**15**	**16**	**17**	**18**
I		1	22	11	11	3	1
II	4		17	19	10	2	
III				1		1	

Table 4. The length of the nestling period in first, see third broods of barn swallows near Bratislava.

Nestling period (days)	Brood			Total number of broods
	first	**second**	**third**	
14	2			2
15	2	1		3
16		1		1
17	3			3
18	7	2		9
19	9	8	1	18
20	11	9		20
21	7	8		15
22	20	11	1	32
23	11	10		21
24	3	4		7
25	3	1		4
26	1			1

Breeding Success

Of the total of 739 eggs, 25 (i.e. 3.38 %) were destroyed (thrown out of the nest, or the whole nest fallen). Of the 714 remaining eggs 167 (22.60 %) failed to hatch. These were either unfertilized or contained dead embryos. Thus from the 739 eggs laid, 547 young hatched (i.e. 74.02 %). Nestling mortality between hatching and nest leaving was 5.12 %. A total of 28 fledglings perished either because they fell out of the nest, or because of to the skin on the sides of the neck down to the shoulder caused by the sharp claws of nest mates. These nestlings probably perished from secondary infection (3 cases). In the two third clutches, all six young that hatched also fledged. The fledging success was 94.52 %. The breeding success was 69.96 %.

In first broods 4.26 % of the nestlings died while nestling mortality in second broods was 6.6 %

(Tab. 2). In first clutches hatched 76.33 % of eggs, in second clutches only 70.90 %.

Of the 14 young that died in first broods, five came from clutches of 5 eggs; in three clutches of 6 eggs, 1, 2 and 4 nestlings died, respectively. The remaining two young that perished came from clutches of 3 eggs. In second brood 14 nestlings died. Two of them were from clutches of 3, eight from clutches of 4 and three from clutches of 5 eggs.

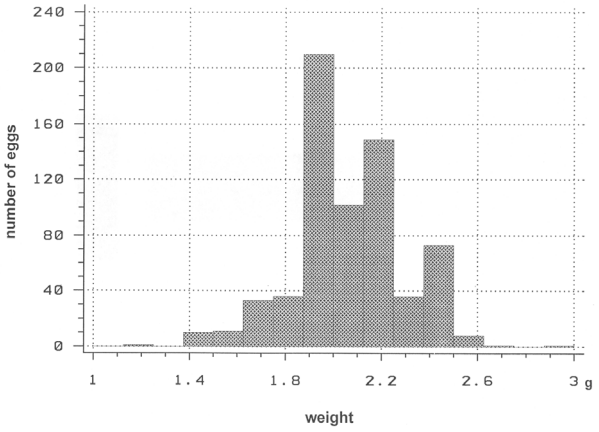

Figure 2. Distribution of barn swallow egg weights.

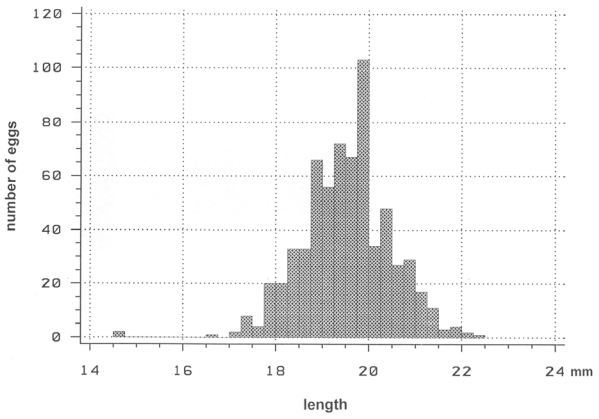

Figure 3. Distribution of barn swallow egg lenghts.

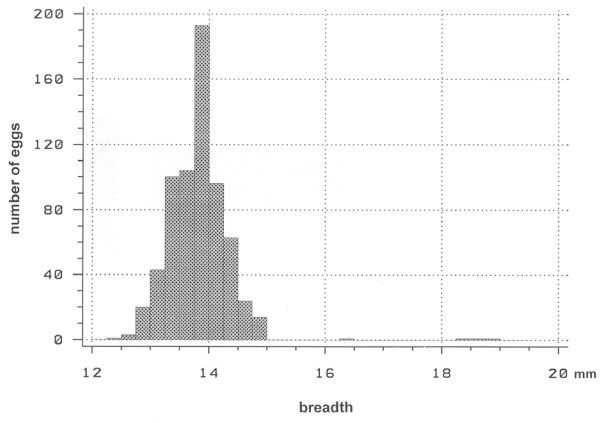

Figure 4. Distribution of barn swallow egg breadths.

Incubation Period and Duration of Nesting

The incubation period ranged from 12 to 18 days, with a mean of 14.83 days (n = 103). The difference in incubation between the first and second nesting is minimal (14.92 in the former and 14.71 in the latter). The minimum incubation period of 12 days was observed four times and the maximum (18 days) only once (Tab. 3). In this case the clutch counted 7 eggs out of which 5 young hatched.

The mean number of days from nest leaving to the start of egg laying in the next nesting was 9.5 days. In one case was the first egg of second clutch laid before the first brood young had left the nest.

The mean length of nestling feeding was 21 days (x = 20.88 ± 0.20, n = 136), the minimum being 14 and the maximum 26 days (Tab. 4). The difference in the duration of nest feeding between the first (20.75 days) and the second nesting (21.09 days) was not statistically significant (t = 0.78, P = 0.22).

The mean total nesting time (from laying of the first egg to nest leaving) was 90 days in two nestings and 41 days in one nesting. The minimum time with two nestings was 82 and the maximum 100 days. With one nesting, the minimum length was 31 and the maximum 74 days.

DISCUSSION

The period during which Barn Swallows initiated clutches in the surroundings of Bratislava lasted 104 days – from 29 April to 10 August, which is in accordance with other studies. From the surroundings of Poznań in Poland, Kuźniak (1967) found this period to be from 1 May to 9 August, hence 101 days. In northern France, the corresponding period lasted from 28 April until 9 August, hence 102 days (Jarry 1982).

The mean number of eggs per clutch in the surroundings of Bratislava was 4.56. Similarly, Pikula & Beklová (1987) reported a mean of 4.47 for clutches from the whole of Czechoslovakia. Kondělka (1985) mentions 4.53 eggs for the surroundings of Ostrava. He found five clutches of 7 eggs each and one clutch of 8 eggs. In Austria (Burgenland), the mean number of eggs per nest inside a building was 4.9 (Fally 1989) and in the surroundings of Poznań it was 4.4 (Kuźniak 1967). Kuźniak (1967) found a 7–eggs clutch in only one case. Similarly in France, the mean number of eggs per clutch was 4.4 (Hemery et al. 1979). In large swallow colonies (8 – 22 pairs) the number of eggs per clutch was lower (4.6 in first and 4.2 in second clutches) than in solitary nests, where the average was 5.8 in first and 4.3 in the second clutches (Shield & Crook 1987). Brood size is influenced by seasonal factors and also by the presence of parasites. Ectoparasitism can by one of the factors that explain

small broods of birds (Møller 1990, 1994, Poiani 1993). The numbers of mites can reach up to thousands and can negatively influence the hatching successfulness (Heeb et al. 1998; Krumpál et al. 1995; Krumpál et al. 2001; Mašán & Országhová 1995; Møller 1990; Richner & Heeb 1995).

The mean weight of swallow egg from the surroundings of Bratislava of 2.09 g slightly exceeds the values reported by some authors from neighbouring countries, e.g. Balát (1983) 1.99 g, Pikula & Beklová (1987) 1.88 g, Kuźniak (1967) 1.86 g. Matoušek (1956) gives a mean weight of 2.18 g for eggs from western Slovakia.

The mean values of dimensions (length x width), 19.55 x 13.86 mm, for eggs from the surroundings of Bratislava are slightly higher than those reported by Balát (1983) – 19.39 x 13.67 mm and Pikula & Beklová (1987) – 19.29 x 13.65 mm. Matoušek (1956) gives the dimension of 20.08 x 13.64 mm from western Slovakia, while Goebel (in Dementev et al. 1954) reports 18.0 – 20.5 x 13.0 – 14.0 mm from Ukraine.

In the present study the mean number of fledglings was 4.83. Kondělka (1985) gives a mean of 4.07 fledglings.

Pikula & Beklová (1987) state that the incubation period ranges from 13 to 20 days, which a mean of 15.1 days, while Kuźniak (1967) found it to be 12 – 18 days, with a mean of 14 – 15 days. Møller (1991) also reports it to last. 15 days. In south–western Slovakia it was likewise within the range of 12 – 18 days, with a mean of 14.8 days (present study).

Nestling mortality from hatching to nest leaving in the surroundings of Bratislava amounted to 5.12 %. Balát (1983) reports an even lower rate (2.65 %).

ACKNOWLEDGEMENTS

The author wishes to express her appreciation to Prof. Ladislav Jedlička (Bratislava) for their valuable comments on her manuscript. This study was supported by the Slovak Grant Agency KEGA grant No. 007 UKF–4/2012

REFERENCES

Balát F, 1983: Hirundo rustica rustica. Hnízdení. In: Hudec K et al.: Ptáci – Aves. Vol. 3/1. Fauna ČSSR 23. *Academia, Praha*, pp. 298–301.

Dementev GP (ed.), 1954: Pticy Sovetskogo sojuza. Vol. VI. *Gosud. Izd. "Sovetskaja nauka", Moskva*, 792 pp.

Fally J, 1989: Die Bedeutung des Neststandortes im Brutgeschehen bei Rauchschwalbe (Hirundo rustica) und Mehlschwalbe (Delichon urbica). *Wissenschaftliche Arbeiten aus dem Burgenland (WAB). Eisenstadt*, 53 pp.

Heeb P, Wernwr I, Kölliker M & Richner H, 1998: Benefits induced host responses against an ectoparasite. *Proc. R. Soc. Lond. B*, 265: 51–56.

Hemery G, Nicolau–Guillaumet P & Thibault JC, 1979: Etude de la dynamique des populations françaises d'Hirondelles de cheminée (Hirundo rustica) de 1956 à 1973. *L' Oiseau et R.F.O*. 49: 213–230.

Jarry G, 1982: Rôle de l□âge des Hirondelles rustiques (Hirundo rustica*)* dans leur biologie de la reproduction. pp. 41–49. In: Héméry (ed.), Principes et applications de quelques methodes recentes de captures – recaptures. *Centre de recherches sur la biologie des populations d□oiseaux. M.N.H.N. Paris.*

Kondělka D, 1985: Gelegengrösse und Brutverluste der Rauchschwalbe (Hirundo rustica) im Nordmährischen Kreis (ČSSR). *Folia Zoologica*, 34: 149–158.

Krumpál M, Cyprich D & Stanko M, 1995: Ticks (Argasidae, Ixodidae) in Birds Nests in Slovakia. *Acta Zool. Univ. Comenianae*, 39: 9–22.

Krumpál M, Cyprich D, Fenďa P & Pinowski J, 2001: Invertebrate fauna in nest of the House Sparrow Passer domesticus and the Tree Sparrow Passer montanus in central Poland. *International Studies on Sparrows*, 27–28: 35–58.

Kuźniak S, 1967: Obserwacje nad biologia okresu lęgowego dymówki, Hirundo rustica L. *Acta ornithologica (Warszawa)*, 10: 177–212.

Mašán P & Országhová Z, 1995: Infestation and age structure of Ornithonyssus sylviarum (Acarina: Mesostigmata) and other mites occurence in the Hirundo rustica nests. *Biologia, Bratislava*, 50: 475–479.

Matoušek B, 1956: Príspevok k oológii slovenskej avifauny. *Biologické práce (Bratislava)*, 2 (7): 1–105.

Matoušek B & Országhová Z, 1994. Occurrence of the Swallow (Hirundo rustica) on the Territory of Slovakia. *Zbor. Slov. Nár. Múz., Prír. Vedy*, 50: 133–194.

Møller AP, 1982: Clutch size in relation to nest size in the Swallow Hirundo rustica. *Ibis*, 124: 339–343.

Møller AP, 1984: Geographical trends in breeding parameters of Swallows and House Martins. *Ornis. Scand*., 15: 43–54.

Møller AP, 1990: Effects of parasitism by a haematophagous mite on reproduction in the Barn Swallow. *Ecology*, 71: 2345–2357.

Møller AP, 1991: Double broodedness and mixed reproductive strategie by female swallows. *Anim. Behav.*, 42: 671–679.

Møller AP, 1994: Parasites an environmental component of reproduction in birds as exemplified by the swallow. *Ardea* 82: 161–172.

Pikula J & Beklová M, 1987: Bionomics of Species of the Family Hirundinidae. *Acta Se. Nat. Brno*, 21 (3): 1–39.

Poiani A, 1993: Small clutch sizes as a possible adaptation against ectoparasitism: a comparative analysis. *Oikos*, 68: 455–462.

Richner H & Heeb P, 1995: Are clutch and brood size patterns in birds shaped by ectoparasites? *Oikos*, 73: 435–441.

Shields WM & Crook JR, 1987: Barn Swallow Coloniality: A net Cost from group breeding in the Adirondacks? *Ecology*, 68: 1373–1386.